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**CLAIMS:**

What is claimed is:

- 1 1. A robot, the robot comprising:  
2 a barcode scanner with a scan path, wherein the  
3 barcode scanner is affixed to the robot;  
4 an attenuation surface affixed to the barcode  
5 scanner, wherein the attenuation surface is located such  
6 that at least one end of the scan path of the barcode  
7 scanner is controlled by the attenuation surface;  
8 a positional encoding device for determining the  
9 location of the attenuation surface with respect to a  
10 target associated with at least one storage cell.
- 1 2. The robot as recited in claim 1, wherein the  
2 attenuation surface comprises a plurality of edges and  
3 wherein at least one of the edges are beveled.
- 1 3. The robot as recited in claim 1, wherein the  
2 attenuation surface is constructed from a material that  
3 is formable into sharp edges.
- 1 4. The robot as recited in claim 1, wherein the  
2 attenuation surface reflects light from a scanner  
3 illumination source in a non-detrimental manner.
- 1 5. The robot as recited in claim 1, wherein the  
2 attenuation surface controls one or more ends of the scan  
3 path during movement of the robot parallel to the scan

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4 path in order to determine a target position in a first  
5 coordinate frame.

1 6. The robot as recited in claim 1, wherein the  
2 movement of the barcode scanner substantially orthogonal  
3 to the scan path will determine the target position  
4 relative to positional data from the robot in a second  
5 coordinate frame.

1 7. The robot as recited in claim 1, wherein the target  
2 is a barcode.

1 8. The robot as recited in claim 1, wherein the  
2 attenuation surface comprises a metal.

1 9. The robot as recited in claim 1, wherein the  
2 attenuation surface is black anodized.

1 10. The robot as recited in claim 1, wherein the barcode  
2 scanner is a laser scanner.

1 11. The robot as recited in claim 10, wherein the laser  
2 scanner comprises:

3 a laser; and

4 a moveable reflecting surface which reflects light  
5 from the laser to an object external to the laser  
6 scanner.

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1 12. A robot, the robot comprising:  
2 a barcode scanner with a scan path, wherein the  
3 barcode scanner is affixed to the robot;  
4 a positional encoding device for determining the  
5 location of the scan path with respect to a target  
6 associated with at least one storage cells within a  
7 storage library.

1 13. The robot as recited in claim 12, wherein the  
2 movement of the barcode scanner substantially orthogonal  
3 to the scan path determines the position relative to  
4 positional data from the robot.

1 14. The robot as recited in claim 12, wherein the target  
2 is a barcode.

1 15. A positional determination device, the device  
2 comprising:  
3 a barcode scanner with a scan path affixed to a  
4 moveable object;  
5 an attenuation surface affixed to the barcode  
6 scanner, wherein the attenuation surface is located such  
7 that at least one end of the scan path is controlled by  
8 the attenuation surface; and  
9 a positional encoding device for determining the  
10 location of the object with respect to an external  
11 object.

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1 16. A library storage system, the system comprising:  
2 a plurality of storage cells, wherein at least some  
3 of the plurality of storage cells include a target;  
4 a robot for moving items to and from the storage  
5 cells, wherein the robot includes a barcode scanner with  
6 a scan path, an attenuation surface, wherein the  
7 attenuation surface is located such that at least one end  
8 of the scan path is controlled by the attenuation  
9 surface, and a positional encoding device for determining  
10 the location of the attenuation surface with respect to  
11 the target.

1 17. The library storage system as recited in claim 16,  
2 wherein at least one of the edges of the attenuation  
3 surface is beveled.

1 18. The library storage system as recited in claim 16,  
2 wherein the attenuation surface is constructed from a  
3 material that is formable into sharp edges.

1 19. The library storage system as recited in claim 16,  
2 wherein the attenuation surface is configured to reflect  
3 a scanner illumination source in a non-detrimental  
4 manner.

1 20. The library storage system as recited in claim 16,  
2 wherein the attenuation surface controls at least one end  
3 of the scan path during movement of the robot parallel to  
4 the scan path to determine target position in a first  
5 coordinate frame.

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1 21. The library storage system as recited in claim 16,  
2 wherein the movement of the barcode scanner substantially  
3 orthogonal to the scan path determines the target  
4 position relative to positional data from the robot in a  
5 second coordinate frame.

1 22. The library storage system as recited in claim 16,  
2 wherein the target is a barcode.

1 23. A method for determining the position of a robot  
2 relative to a target, the method comprising:  
3 translating a robot having a barcode scan engine  
4 with a scan path having a scan path width controlled by  
5 an attenuation surface in a direction substantially  
6 parallel to the scan path;  
7 determining a first parallel position at which the  
8 target is first readable by the barcode scan engine; and  
9 determining a second parallel position at which the  
10 target is first becomes unreadable by the barcode scan  
11 engine.

1 24. The method as recited in claim 23, further  
2 comprising:  
3 determining the center of the target in the parallel  
4 direction from the first and second parallel positions.

1 25. The method as recited in claim 24, wherein the step  
2 of determining the center of the target in the parallel  
3 direction comprises assigning a position halfway between

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4 the first and second parallel positions as the center  
5 position of the target in the parallel direction.

1 26. The method as recited in claim 23, further  
2 comprising:

3 translating the robot in a direction substantially  
4 perpendicular the scan path;

5 determining a first perpendicular position at which  
6 the target first becomes readable to the barcode scanner;  
7 and

8 determining a second perpendicular position at which  
9 the target first becomes unreadable by the barcode  
10 scanner.

1 27. The method as recited in claim 26, further  
2 comprising:

3 determining the center of the target in the  
4 perpendicular direction from the first and second  
5 perpendicular positions.

1 28. The method as recited in claim 27, wherein the step  
2 of determining the center of the target in the  
3 perpendicular direction comprises assigning the midpoint  
4 between the first and second perpendicular positions as  
5 the center of the target in the perpendicular direction.

1 29. A system for determining the position of a robot  
2 relative to a target, the system comprising:

3 first means for translating a robot having a barcode  
4 scan engine with a scan path having a scan path width

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3        fourth means for determining the center of the  
4        target in the parallel direction from the first and  
5        second parallel positions.

1 31. The system as recited in claim 30, wherein the  
2 fourth means comprises assigning a position halfway  
3 between the first and second parallel positions as the  
4 center position of the target in the parallel direction.

1 32. The system as recited in claim 29, further  
2 comprising:  
3 fourth means for translating the robot in a  
4 direction substantially perpendicular the scan path;  
5 fifth means for determining a first perpendicular  
6 position at which the target first becomes readable to  
7 the barcode scanner; and  
8 sixth means for determining a second perpendicular  
9 position at which the target first becomes unreadable by  
10 the barcode scanner.

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1 33. The system as recited in claim 32, further  
2 comprising:  
3 seventh means for determining the center of the  
4 target in the perpendicular direction from the first and  
5 second perpendicular positions.

1 34. The system as recited in claim 33, wherein the  
2 seventh means comprises assigning the midpoint between  
3 the first and second perpendicular positions as the  
4 center of the target in the perpendicular direction.

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